ANALYSIS OF SPELLING PERFORMANCE IN ENGLISH AMONG STUDENTS WHOSE FIRST LANGUAGE IS ARABIC

A Thesis

by

ZAINAB ABDULAMEER AHMED ALLAITH

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2009

Major Subject: Curriculum and Instruction

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Approved by:

Chair of Committee,	R. Malatesha Joshi
Committee Members,	Dennie Smith
	Robert Hall
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ABSTRACT

Analysis of Spelling Performance in English among Students

Whose First Language Is Arabic. (May 2009)

Zainab Abdulameer Ahmed Allaith, B.A., University of Bahrain

Chair of Advisory Committee: Dr. R. Malatesha Joshi

One of the main differences between English monolinguals and English language learners is that the latter use their knowledge of their first language in spelling in English. Previous studies have shown that the nature of first language affects spelling in English. One of the factors which influence spelling in English is the phonology of first language. The main aim of this study was to examine the spelling performance in English among students whose first language was Arabic in two novel phonemes (/p/ and /v/) and their phoneme pairs (/f/ and /v/).

The analyses were based on a dictation task. There were eight target words for each phoneme. Each word had a target phoneme embedded in the initial or the final position. There were 99 Arabic speaking participants from fourth grade whose performance was compared with 40 monolingual English speaking participants.

Findings of the present study indicated that the Arabic participants had particular difficulty in spelling the novel phonemes /p/ and /v/ with large effect size. The participants mostly confused these two phonemes with their phoneme pairs and spelled /p/ as *b* and /v/ as *f*. The Arabic participants also had some difficulty in spelling the

phoneme pairs /p/ and /v/, and spelled /b/ as *p* and /f/ and *v*. This finding had a medium effect size. Finally, both groups of participants generally performed better when the target phoneme was in the initial position.

The present study is a contribution to the current literature about the effect of first language on spelling in English. In order to establish a universal theory about how language learners acquire the English spelling and to compare and contrast the acquisition of spelling of native speakers of English and English language learners, it is fundamental to examine the world's various languages and their effect on second language spelling acquisition. Additionally, the findings of this study can provide practical implications for language literacy classes which are designed for Arabic students.

DEDICATION

To my dear husband,

Mohamed Al-Samahiji,

whose devotion, inspiration, support,

and love have made our dream a reality

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First and foremost, I am grateful to God for all of the everlasting and countless graces which He has generously given to me and for paving my road with success and giving me this excellent opportunity to continue my education. Thank you for providing me with the patience and strength I need, not just in my thesis work, but in my everyday life as well. Undoubtedly, I would not have been able to reach this accomplishment, or any other achievements in my life, without your will and blessings.

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CHAPTER I

INTRODUCTION

In order to master literacy, one must not only be able to read and write, but to spell as well (McCardle, Chhabra, & Kapinus, 2008). Spelling is "the encoding of linguistic forms into written forms (Perfetti, 1997, p. 22). Two of the most important processes which spelling relies on are phonological awareness and alphabetic knowledge. Previous research has shown that among the best predictors of a child's spelling success is his or her phonological knowledge (e.g., Goswami & Bryant, 1990; Lundberg, Olofsson, & Wall, 1980; Mann & Liberman, 1984; Rack, Snowling, & Olson, 1992; Shankweiler, 1999; Torgesen, 1999, as cited in Wang & Geva, 2003a), and the knowledge about letters and their sounds (McBride-Chang, 1999; Share, Jorm, Maclean, & Mathews, 1984; Snow, Burns, & Griffin, 1998, as cited in Treiman, 2006). Most of the previous research has focused on English monolinguals. Nevertheless, the literacy acquisition among English second language learners differs from first language learners because they use their knowledge of their first language in learning to read, write, and spell in their second language (Figueredo, 2006). How does knowledge of first language affect spelling in English as a second language? This study sought to examine the English spelling performance of children whose first language is Arabic, and to highlight some of their spelling errors in relation to their first language.

This thesis follows the style of *Reading and Writing: An Interdisciplinary Journal*.

Background about Spelling and Literacy

There has been an increase in spelling research in the past years due to the importance spelling has on literacy acquisition (e.g. Conrad, 2008; Ehri, 1986; Kwong &Varnhagen, 2005; Rittle-Johnson & Siegler, 1999; Treiman & Bourassa, 2000). According to the National Adult Literacy Survey (NALS), literacy is "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993, p. 14). The importance of literacy in our society today cannot be overemphasized. Learning to read and write is the foundation of academic ability (Lyon, 2001). Failure to acquire literacy in early grade levels is likely to hinder children's progress in all subjects throughout the rest of their school years because they will not be able to comprehend grade-level textbooks (Elbro & Scarborough, 2004). Failing to acquire literacy has deleterious educational and public health consequences on the society as well. According to Lyon (2001), 75% of the students who drop out of school reported difficulties in learning to read; and at least half of the criminal adolescents and adults have reading difficulties; while only 2% of them will continue on to a four-year college program. Failure at school also has devastating consequences on self-esteem, social development, and opportunities for advanced education and meaningful employment (Lyon, 2001). Nevertheless, about 1.5 billion people around the world cannot read, approximately 25% of the U.S. population has difficulty acquiring reading and spelling, and about 38% of the fourth grade population nationally cannot read at the basic level (Lyon, 2001). In addition, 21-23% of the U.S. adult population ages 21 to 25 scored at Level 1 on the National Adult

Literacy Survey (Kirsch et al., 1998, as cited in Lunenburg, 1999). This means that their scores ranged from having no reading, writing, and quantitative skills to being able to total an entry on a bank deposit slip or locate the time or place of a meeting on a form. Spelling is important for literacy because of its close relationship with reading and writing. Spelling supports reading because the two processes are reciprocally related and they both follow a similar course of acquisition (Ehri, 2000). Furthermore, spelling supports writing. This is because "spelling and text production in later grades will require that students can automatically and legibly write alphabet letters and match sounds in words to associated spelling patterns" (Ritchey, 2008, p. 44). In addition, writers who must think too hard about how to spell use up valuable cognitive resources needed for higher aspects of composition (Singer & Bashir, 2004, as cited in Moats, 2005). Spelling also plays an important role in our daily lives. It is necessary in various occasions which range from undemanding tasks such as: filing alphabetically; looking up words in a phone book, dictionary, or thesaurus; writing notes that others can read; and even playing parlor games (Moats, 2005), to more complex tasks such as reading and writing. Spelling is also associated with competence. The National Commission on Writing for America's Families, Schools, and Colleges (2005) reported that 80% of poorly written or poorly spelled applications are doomed (as cited in Moats, 2005).

Factors Which Influence Literacy Acquisition

There are many factors which influence the acquisition of literacy. Those factors include but are not limited to: socioeconomic background, family literacy practices, and

early school experience. Parsons and Bynner (1998) found that the illiteracy rate is higher and more evident among families that come from poverty and disadvantaged circumstances. Literacy is also influenced by family practices. According to Wasik and Hendrickson (2004), children who were actively engaged in literacy activities with their parents demonstrated higher scores on early literacy instruments than children who were not; and family engagement in literacy activities positively influenced the children's motivation for learning (Brisk & Harrington, 2000). Nevertheless, the most crucial factor which plays a role in literacy acquisition is early instruction. Parsons and Bynner (1998) reported that adults with poor literacy "were the least likely in the cohort to have been read to as a child" and "they were less likely to have experienced teaching of phonics (letter sound) and basic number work by age 5" (p. 9).

The orthographic depth is another factor which many influence the acquisition of literacy. Generally, orthographies can be transparent (shallow) or opaque (deep). Transparent orthographies such as Spanish and Italian have a high regular correspondence between graphemes and phonemes. Opaque orthographies such as Chinese, on the other hand, have inconsistent correspondence between graphemes and phonemes. The transparency of a writing system is relative. English, for example, has a less direct relationship between the graphemes and phonemes because morphological information is coded in the spelling (Aro, 2006). The level of transparency of a language accounts for literacy acquisition (Brisk & Harrington, 2000; Seymour, Aro, & Erskine, 2003). For example, students can master decoding in Spanish when they receive appropriate instruction in the early grade levels, while Chinese children do not master

enough written language to read a newspaper until sixth grade (Brisk & Harrington, 2000). Furthermore, Paulesu and others (2001, as cited in Bear, Templeton, Helman, & Baren, 2003) found that reading difficulties were less common amongst Italian speakers in comparison to English speakers. Finally, Seymour et al. (2003) found that it generally took English language learners two years to become accurate and fluent in foundational level reading as opposed to children from other European countries who were generally fluent at the end of the first school year. Seymour et al. explained that the reading development rate is more than twice as slow in English orthography in comparison to the reading development rate in other shallow orthographies due to the language's orthographic characteristics. The findings of research suggest that children whose language is transparent are less likely to have problems in literacy acquisition than children whose language is opaque.

Spelling and English as a Second Language

The importance of spelling is not limited to individuals whose first language is English, but to English language learners as well. The population of English language learners has grown 46% in the U.S. between the years 1990 and 2000 (National Clearinghouse for English Language Acquisition, 2002, as cited in Figueredo, 2006); and it is estimated that 235 million people around the world speak English as a second language (Crystal, 1997, as cited in Figueredo, 2006).

The development of the English language learners' spelling differs from those whose first language is English. It has been well established in literature today that

unlike English monolinguals, language learners use knowledge of their first language when they learn to spell in English. Since language learners use their knowledge of their first language in learning to spell in English, the proficiency level of first language is closely related the acquisition of second language spelling. According to Brisk and Harrington (2000), "literacy skills are acquired only once through one language and then applied to new languages" (p. 4). Language transfer from first language to English can be defined as “the effect of first language knowledge that was learned during the development of first language skills on learning or performance when spelling in English as a second language” (Figueredo, 2006, p. 880). When a language learner is competent in his or her first language, the transfer of spelling to second language can be positive or negative. In the case of positive transfer, there are commonalities between the first language and second language and those commonalities learned in the first language are applied in the second language (Figueredo, 2006). An example of positive transfer is the transfer of letter knowledge or phonological awareness (Figueredo, 2006). Negative transfer on the other hand occurs when language learners have not learned the English-specific knowledge, or when they do not show consistent reliance on it (Figueredo, 2006). In this case, the transfer from first language to second language is strategic but inappropriate (Figueredo, 2006). An example of negative transfer is the errors caused by first language pronunciation of phonemes (Figueredo, 2006). Many studies have demonstrated the effect of first language on second language spelling (e.g. Abu-Rabia & Siegel, 2002; Arab-Moghaddam & Sénéchal, 2001; Cronnell, 1985; Durgunoğlu, Mir, &

Ariño-Marti, 2002; Fashola, Drum, Mayer, & Kang, 1996). These studies will be discussed in more detail in the literature review.

Many factors may account for the acquisition of second language. Among the factors which influence the transfer of spelling from first language to second language is the orthography of the first language. Writing systems are usually classified according to the "levels of linguistic information that is coded in the script" (Aro, 2006, p. 533). One of many classifications of orthographies is DeFrancis's (1989), who divided the writing systems to *syllabic*, *consonantal*, and *phonemic*. Words in syllabic languages are made of graphic symbols. DeFrancis divided syllabic languages into "pure" syllabic (Japanese kana), and meaning-plus-sound syllabic (Chinese). Words in consonantal languages are made of graphemes which represent consonants only. The script can be "purely" consonantal (Phoenician, Hebrew, Arabic), or meaning-plus-sound consonantal (Egyptian). Finally, the script of phonemic languages represents all phonemes. It can be "purely" phonemic (Greek, Latin, Finnish) or meaning-plus-sound phonemic (English, Korean). Of course, meaning-plus-sound scripts include non-phonetic clues in the script, such as morphological clues. DeFrancis used the term *pure* in quotations to suggest that it is a conventional term and that writing systems are relative and not pure. The orthography of first language can affect the transfer of spelling from first language to second language.

The Arabic Language

Arabic is the first language of about 206 million people around the world (mostly

in the Middle East and North Africa), and the second language of about 246 million people (Gordon, 2005). Arabic is the language of the holy book of Islam, the Quran. Hence, many non-Arabic Muslims around the world are interested in learning the language. Furthermore, due to the connection between Arabic and Islam, many languages adopted the Arabic alphabet with the spread of Islam (such as Barber, Farsi, Fula, Hausa, Hebrew, Kashmiri, Kazakh, Malay, Pashto, Portuguese, Serbo-Croatian, Somali, Spanish, Sudanese, Swahili, Turkish, Uighur, and Urdu) and it is ranked second to the Roman alphabet to the extent which it is used around the world (Coulmas, 1996).

Arabic is a Semitic language. It is a branch of the Nabatean Aramaic script and its earliest inscriptions go back to around the second or fourth century (Coulmas, 1996; Bauer, 1996). Nevertheless, the refined form of the language was not modified until the seventh century with the pre-Islamic poetry and later in the Quran (Coulmas, 1996). The writing systems of Semitic languages have some common unique characteristics. Jensen (1969) describes two of the important features of Semitic languages: (1) Written signs express consonants, and vowels are only optional. Hence signs can be read in different ways depending on where they appear in context and their grammatical construction. (2) Words are usually made of three consonants which bear the meaning, while vowels have a secondary role (for example, قتل /q-t-l/ is the base word for everything connected to killing: to kill, death, murder, and so forth). Below is a description of the unique characteristics of the Arabic language, with reference to its Semitic features.

Arabic is written from right to left just like other Semitic scripts (Coulmas, 1996). The Arabic alphabet comprises of 28 letters. The inventory of Arabic consonants

is richer than the classical Aramaic alphabet as it has six additional consonant letters (Coulmas, 1996). Since Aramaic has fewer consonants than Arabic, some letters in Arabic stand for more than one consonant; and therefore, from the seventh century onwards, dots were introduced to eliminate ambiguity of letters that look the same (Bauer, 1996). The reading signs are integrated with the words and are placed over and under the letters. The introduction of the dots and signs was especially important to comply with the need to guarantee an unequivocal reading of the holy Quran (Bauer, 1996). As a result of the introduction of dots, some letters in Arabic are visually identical with the exception of the position and number of dots (e.g. ـبـ /b/, ـتـ /t/, ـثـ /θ/, and ـنـ /n/).

Another characteristic of the Arabic language which is related to letter shapes is the variation of the form of letters according to their position in the word. Generally, there are four forms for each letter: independent, initial, medial, and final (see Table 1). However, there are six non-connecting letters which cannot be joined to other letters; أ, و, د, ذ, ر, and ز (/ʔ/, /w/, /d/, /ð/, /r/, and /z/ consecutively). This results in the articulated appearance of Arabic writing (Coulmas, 1996).

Many of the Arabic consonants are similar to the English consonants. Except for the sounds /g/, /p/, /v/ and /ʧ/, all of the English consonants are a part of the Arabic alphabet. There are also several additional sounds (see Table 1). Since Arabic is a consonantal language in which only consonants and long vowels are represented by letters, signs of short vowels and gemination were introduced along with the introduction of dots in the seventh century (Bauer, 1996). The vowel system of the Arabic language consists of three short vowels: (1) *fat'hā* ◌َ (ă, ä, e, and å), (2) *kasr*ā ◌ِ (ĭ and y), and (3)

Table 1 The Arabic letter names, their transcription, and shapes in the isolated, initial, medial, and final forms.

Name	transliteration	IPA Transcription	Isolated	Initial	Medial	Final
ɔalif	ɔ, ā	/ʔ/, /aː/	ا	-	-	ـا
bāɔ	b	/b/	ب	بـ	ـبـ	ـب
tāɔ	t	/t/	ت	تـ	ـتـ	ـت
ṯāɔ	ṯ, th	/θ/	ث	ثـ	ـثـ	ـث
ǧīm	ǧ, dj	/dʒ/	ج	جـ	ـجـ	ـج
ḥāɔ	ḥ	/ħ/	ح	حـ	ـحـ	ـح
ḫāɔ	ḫ, kh	/x/	خ	خـ	ـخـ	ـخ
dāl	d	/d/	د	-	-	ـد
ḏālɔ	ḏ, dh	/ð/	ذ	-	-	ـذ
rāɔ	r	/r/	ر	-	-	ـر
zāy	z	/z/	ز	-	-	ـز
sīn	š, sh	/s/	س	سـ	ـسـ	ـس
šīn	š	/ʃ/	ش	شـ	ـشـ	ـش
ṣād	ṣ	/sˤ/	ص	صـ	ـصـ	ـص
ḍād	ḍ	/dˤ/	ض	ضـ	ـضـ	ـض
ṭāɔ	ṭ	/tˤ/	ط	طـ	ـطـ	ـط
ẓāɔ	ẓ	/ðˤ/ /zˤ/	ظ	ظـ	ـظـ	ـظ
cayn	c	/ʕ/	ع	عـ	ـعـ	ـع
ġayn	ġ, gh	/ɣ/	غ	غـ	ـغـ	ـغ
fāɔ	f	/f/	ف	فـ	ـفـ	ـف
qāf	q, ḳ	/q/	ق	قـ	ـقـ	ـق
kāf	k	/k/	ك	كـ	ـكـ	ـك
lām	l	/l/	ل	لـ	ـلـ	ـل
mīm	m	/m/	م	مـ	ـمـ	ـم
nūn	n	/n/	ن	نـ	ـنـ	ـن
hāɔ	h	/h/	ه	هـ	ـهـ	ـه
wāw	w, ū	/w/, /uː/	و	-	-	ـو
yāɔ	y, ī	/j/ / /iː/	ي	يـ	ـيـ	ـي

Note: This table is adapted from Bauer (1996).

*damm*ā ◌ُ (ŭ, ŏ, and ö) (Jensen, 1969). The *fat'hā* is represented with a small horizontal line above the consonant letter, the *kasrā* is represented with a small horizontal line below the letter, and the *dammā* is represented with a little hook over the consonant letter (Coulmas, 1996). Each of these three short vowels is paired with a long vowel: ā, ī,

and ō consecutively. The three long vowel signs are indicated by employing three consonant letters: ا *ɔalif*, ي *yāɔ*, and و *wāw*. In addition to the long vowels, there are two diphthongs: *ai* and *au* which are also indicated with the consonants ي *yāɔ* and و *wāw* successively (Jensen, 1969). Moreover, there are three other reading marks in Arabic: *sukūn*, *shada*, and *hamza*. *Sukūn* ْ is indicated with a small circle above the letter and it is used to show the absence of a vowel. *Shada* ّ is used to show doubling of a consonant. Finally, *hamza* ء is used to indicate a glottal stop (Jensen, 1969). Lastly, لا is the symbol which is used for joining the letters ل and ا (l and a), and ة is the symbol which is used for joining ت and ه (t and h) (Nakanishi, 1980).

Typically, texts are fully vowelized with diacritical marks for beginning and struggling readers. However, texts are generally unvowelized for adults and more advanced readers. Hence, the reader has to deduce vowel signs by relying on the context or prior linguistic knowledge (Abu-Rabia & Siegel, 1995). Vowelized Arabic orthography is considered transparent, since the grapheme-phoneme correspondences are simple, invariant, and the deduction of phonological information is straightforward; in contrast to the unvowelized Arabic which is considered opaque or deep (Taouk & Coltheart, 2004). In the case of unvowelized texts, the diacritics are absent and therefore alternative pronunciations and meanings are possible for a given word. A large number of Arabic words are homographic when they are written without vowels (Elbeheri & Everatt, 2007). For example, دَرَسَ /darasa/ (he studied), دَرْسْ /dars/ (lesson), دَرَّسَ /darrasa/ (he taught), and دُرِسَ /durrisa/ (it was taught) are words that have different meanings but have the same grapheme representation when they are written without vowels (Elbeheri

& Everatt, 2007). In cases like this, the grammatical construction and prior knowledge of the reader are the key factors for deducting vowels and phonemes and deciding which meaning and pronunciation is intended in the text (Taouk & Coltheart, 2004).

Reading unvowelized texts is a difficult process, even for skilled Arabic readers. The function of the diacritics in Arabic is to covey the unequivocal phonemic structure of the printed words (Abu-Rabia, 2001). Hence, readers have to depend on context in the absence of phonological information in order to arrive at the appropriate phonological form of the word (Elbeheri & Everatt, 2007). Abu-Rabia (2001) explained some of the sources of difficulty for reading Arabic texts. To begin with, beginning and struggling readers have to rely on the identification of consonant clusters and their correspondence to prior semantic knowledge when they are presented with unvowelized texts (Abu-Rabia, 2001). This process is especially difficult because Spoken Arabic differs greatly from Literary Arabic. Furthermore, the homographic nature of the Arabic language when it is unvowelized adds to the complexity of reading Arabic. In addition, the ends of the words in Arabic are vowelized differently according their position and function in the sentence. In other words, the same Arabic word can have more than one vowelization form depending on its function in the sentence. Therefore, mastering the reading process in Arabic demands simultaneous automatic processing of resources at the word and sentence context level (Abu-Rabia, 2001).

A unique characteristic which distinguishes Arabic from many other languages is its diglossic nature. Diglossia is term which was coined by Ferguson (1959). It refers to a

phenomenon characterized by the presence of two or more varieties of the language; spoken and written. Ferguson defined diglossia as:

> [Diglossia is] a relatively stable language situation in which, in addition to the primary dialects of the language (which may include a standard or regional standards), there is a very divergent, highly codified (often grammatically more complex) superposed variety, the vehicle of a large and respected body of written literature, either of an earlier period or in another speech community, which is learned largely by formal education and is used for most written and formal spoken purposes but is not used by any sector of the community for ordinary conversation (p. 336).

The case of diglossia in the Arab world is evident in the presence of two varieties of Arabic; Spoken Arabic and Literary Arabic. The varieties of the Arabic language differ in vocabulary, syntax, morphology, and phonology. Spoken Arabic does not have a written form. It is used by the Arabic people to communicate among each other in informal situations. It is the language one would use for daily communication for family and friendly talks, shopping, and some drama programs on television. There are many varieties of Spoken Arabic in the Arab world. For example, the Spoken Arabic in Egypt differs from the Spoken Arabic in the Bahrain. Furthermore, there are different dialects of Spoken Arabic within each country.

Literary Arabic on the other hand is more complex than Spoken Arabic. It is the language which is used in formal oral and written settings. It is used in books, newspapers, formal public speeches, and most television programs, especially the news.

Most of the children in the Arab world do not begin learning Literary Arabic until they begin their formal education. Hence, they find themselves obliged to learn to read and write in a language different from the one they use at home, and to learn school subjects in a language which is new to them.

Diglossia is one of the most important factors which must be taken into consideration when conducting studies on Arabic speaking learners. This is because Literary Arabic is almost like a second language for the Arabic learners. Ibrahim (1983) argued that Arabic is not the mother-tongue language of Arabs. It is the learners' second language and it should be treated as such. He compared acquiring Literary Arabic by Arabic speakers to native speakers of French or Italian acquiring Latin. In line with Ibrahim's paper, a study by Ibrahim and Aharon-Peretz (2005) compared the semantic priming effects in auditory lexical decision within the Spoken Arabic with the effects found across languages (Literary Arabic and Hebrew). The findings of this study indicated that semantic priming was larger when the primes were presented in the Spoken Arabic than when the primes were presented in Literary Arabic or Hebrew. Ibrahim and Aharon-Peretz concluded that although literary Arabic is used in formal and media contexts, it remains a second language in the cognitive system. According to Ayari (1996), Arabic readers cannot decode in the same way as native English readers due to its diglossic nature. English readers rely on identification of letter strings and their correspondence to the spoken language. However, Arabic readers cannot relate letter strings to spoken Arabic because Arabic is almost a second language to them.

CHAPTER II

LITERATURE REVIEW

The spelling of second language learners of English differs from the spelling of English monolinguals because language learners use their knowledge of their first language when spelling in English. Not all language learners acquire English in the same manner and literacy acquisition among the world's various languages may be different from one language to another. Among the factors which influence language learners' English spelling are: proficiency of first language, orthographic depth of first and second languages, and phonemes of first language.

Proficiency of First Language

Cummins (1979, 1984, as cited in Sparks, Patton, Ganschow, Humbach, & Javorsky, 2008) developed the "linguistics interdependence hypothesis". In this hypothesis, he argued that "language and literacy skills can be transferred from one language to another" and that "success in [second language], for example, reading, depended on previous competence in [first language] literacy skills" (Sparks et al., 2008, p. 162). Recent studies have provided evidence of language transfer from first language to second language. Sparks, Patton, Ganschow, Humbach, and Javorsky (2006) studied 54 students over a period of 10 years. All of the participants had studied Spanish, French, or German for 2 years. The students were tested in their native language using measures of literacy, oral language, and cognitive abilities when they were at elementary

school. Their foreign language aptitude was measured at the beginning of ninth grade, and later their foreign language proficiency level was evaluated at the end of tenth grade. The results of this study showed that the best predictors for foreign language proficiency were the native language literacy measures. The findings of this study support the transfer between first language and second language skills.

In another study, Sparks et al. (2008) found that early first language skills predicted later second language reading and spelling skills. Students were followed over a ten year period in order to examine whether performance on reading, spelling, phonological awareness, vocabulary, and listening comprehension measures in their first language predicted their reading and spelling abilities in their second language. The students were measured in the specified areas in grades 1 through 5 to predict their success in reading and spelling in high school. The results of this study showed that: (1) The best predictors of second language decoding skills were the first language decoding skills. (2) The best predictors of second language spelling skills were the first language spelling skills and phonological awareness. (3) The best predictors of second language reading comprehension skills were the first language reading comprehension skills. The results suggested that word decoding skills, spelling skills, and reading comprehension skills transfer from first language to second language. Hence, first language servers as the foundation for second language, and problems with any component such as phonological processing in the first language is likely to have a negative effect on both first and second languages (Spark et al., 2008).

Several studies found positive correlation between spelling in first language and second language in languages which use the Roman alphabet (e.g., Durgunoğlu et al., 2002) and languages which use other alphabetic systems (e.g., Abu-Rabia & Siegel, 2002; Arab-Moghaddam & Sénéchal, 2001; McBride-Chang, 1998). Durgunoğlu et al. (2002) studied the spelling of fourth grade Spanish speaking bilingual children. The children were asked to spell both English and Spanish words. The findings of this study showed a positive correlation between the English and the Spanish spelling tasks, implying that students who are familiar with the mechanics of spelling in their first language are apt to do better in spelling in their second language. McBride-Chang (1998) conducted a study on undergraduate students from Hong Kong and found that although spelling in Cantonese did not correlate with spelling in English, the verbal memory of their first language correlated with spelling in English. Additionally, Abu-Rabia and Siegel (2002) compared the spelling of bilingual Arabic children (grades 4-8) with monolingual English children matched for age. The findings of this study indicated significant correlation between spelling in Arabic and spelling in English. In addition, the bilinguals who had reading disability performed significantly better than the monolinguals with reading disability on the spelling measures, reflecting positive transfer from Arabic to English. Moreover, Arab-Moghaddam and Sénéchal (2001) examined the spelling performance of bilingual Persian children in grades 2 and 3 and found a correlation between Persian phonological and orthographic processes and English spelling, and between spelling in English and Persian.

The Nature of First Language Orthography

The orthographic depth of the first language can have an effect on the English spelling of language learners. Children whose first language is highly transparent may use the sound-to-spelling strategy to spell English words, which may result in spelling errors (Cronnell, 1985; Durgunoğlu et al., 2002; James, Scholfield, Garrett, & Griffiths, 1993; Luelsdorff, 1986). Cronnell (1985) analyzed the spelling errors in writing samples of Spanish speaking children from grades 3 and 6 who were living in a low-income neighborhood. He attributed some of their spelling errors in English to the Spanish sound-to-spelling correspondence. For example, some students spelled *clean* as *clin*, *rock* as *rack*, *blouse* as *blaus*, and *once* as *ones*. In all of these instances, the children used the transparent spelling of Spanish in spelling English words. In addition, Durgunoğlu et al. (2002) investigated the spelling of grade 4 Spanish children who had just been transitioned from a Spanish-English bilingual education program to English instruction. The findings of this study indicated that the Spanish children had a tendency to spell words as they heard them and that the most common strategy which Spanish children used to Spell English words was "to use spelling-sound correspondences systematically and spell the words as they were heard, hence transferring strategy that is quite effective for the more transparent Spanish orthography to English spellings" (p. 95). Example of errors were *shold* (should), *reel* (real), *wich* (witch), *favret* (favorite), and *rid* (read). Similar findings were noted with German children in words like *chise* (cheese) and *kiep* (keep) (Luelsdorff, 1986), and for Welsh children in words like *trawt* (trout) (James et al. 1993).

James et al. (1993) examined the spelling errors of bilingual North Welsh English children (mean age 10 years 7 months). North Welsh is a transparent language with regular predictable sound-to-grapheme correspondences. The children were given a writing task in which they were asked to write instructions (in English) for playing a game called *Snakes and Ladders*. The spelling errors were either considered developmental errors or were attributed to the Welsh language. The authors of this study noted that about 38.5% of the spelling errors were due to the interference of first language. For example, Welsh students used simple graphemes and produced spelling errors like *dir* (dear), *bur* (beer), *nyr* (near), and *tiws* (choose).

The phonographemic level of the English learners' first language can also have an influence on spelling in English. English language learners whose first language is written using Roman alphabet, like Spanish and German, may know that words can be segmented into phonemes like English monolinguals (Figueredo, 2006) and hence use this knowledge to spell English words (Bebout, 1985; Ferroli & Shanahan, 1993; Terrebone, 1973, as cited in Figueredo, 2006). On the other hand, children whose first language has a higher phonographemic level need to learn to segment words into phonemes (Treiman & Kessler, 2005, as cited in Figueredo, 2006). A good example to demonstrate this notion is the findings of Wang and Geva's (2003b) spelling analysis of Chinese, a morpho-syllabic language. Wang and Geva analyzed the spelling errors of second grade Chinese children who were enrolled in public schools in Toronto. Participants in this study spoke Cantonese at home and had received instruction in Chinese prior to school entry. In addition, they were all receiving some type of

instruction in Chinese outside of school when the study took place. Wang and Geva found that the Cantonese children performed more poorly than their English monolingual peers in spelling pseudowords regardless of the insignificant difference between the two groups in spelling real words. The authors explained that the Cantonese children used a non-phonological route to spell English words, which is the route they had acquired from learning their first language and transferred to English. The Cantonese children's first language resulted in difficulty for them in converting phonemes to graphemes. Nevertheless, on a positive level, the Cantonese children outperformed their English monolingual peers in the confrontation pseudowords task. The children were asked to write letter strings which were orthographically illegitimate and unpronounceable. The Chinese children transferred their visual processing skills to English spelling. The visual processing skills of the Chinese children were well-developed through reading and writing in their first language and helped them in outperforming the English monolinguals on this task (Wang & Geva, 2003b).

Similar findings to Wang and Geva's (2003b) study were noted by Holm and Dodd (1996). Holm and Dodd compared the spelling performance of university students from China, Hong Kong, Vietnam, and Australia. The Australian participants spoke English as their first language. The Vietnamese had acquired their alphabetic knowledge from their first language as Vietnamese is an alphabetic language which utilizes Roman characters. The alphabetic literacy was established for the Chinese participants with the introduction of pinyin, which employs the Roman letters to phonemically represent the Chinese language. On the other hand, the first language of the Hong Kong participants is

non-alphabetic and they had not learned an alphabetic system prior to their exposure to English. The findings of this study indicated that the Hong Kong students had more difficulty in spelling pseudowords than the Australian, Chinese, and Vietnamese participants.

Phonology of First Language

The similarities and differences between first and second language phonemes can have different effects on spelling in English as a second language. When two languages have some commonalities (e.g. phonology, correspondence between graphemes and alphabet), positive transfer can occur when the learner is proficient in his or her first language and commonalities learned in the first language are applied in the second language (Figueredo, 2006). However, when there are differences between the two languages and the learners apply knowledge of first language in spelling in English, the transfer will be negative. The inconsistency of the pronunciation of first and second language phonemes can either result in replacing the English phoneme with a similar first language phoneme, or in dropping the English phoneme from the word (Figueredo, 2006).

When words in the second language contain a phoneme which is not present in the first language sound system, children may substitute the phoneme with another similar one which is used in their first language (e.g. Cronnell, 1985; Durgunoğlu et al., 2002; Fashola et al., 1996). Cronnell (1985) examined the spelling errors of third and sixth grade Hispanic children who were enrolled in a large school district in Los

Angeles. He found some spelling errors which could be linked to the influence of the pronunciation of first language. For example, Cronnell found some errors which resulted from the confusion of /v/ with /b/ as in *bery* (very) and *combins* (convince) in some students' writing samples; which can be a result of the fact that there is no distinction between the sounds /b/ and /v/ in Spanish. Cronnell also found errors such as *steel* (still) and *it* (eat) and he connected these errors with the absence of the /i:/ sound in Spanish and /i/ being the closest sound to this phoneme in English. In addition, Cronnell found errors such as *op* (up) and *fan* (fun); which can be attributed to the absence of /ʌ/ in Spanish. Finally, Cronnell reported errors due to confusion of sounds which do not contrast in the Spanish language: /ð/ and /d/, and /z/ and /s/, and the use of the phonemes /ʧ/ and /ʃ/ interchangeably (as some Spanish dialects only have /ʧ/ or /ʃ/). Fahola et al. (1996) similarly found application of Spanish phonological rules in English spelling of second, third, fifth, and sixth grade Spanish speaking children in words like *havit* (habit) and *favric* (fabric).

The substitution of a phoneme with a similar phoneme from first language was not only found in studies conducted on languages which use the Roman alphabet like Spanish, but even with children whose first language orthography differs significantly from English (Cook, 1997; Wang & Geva, 2003a). Cook (1997) examined the spelling errors of adult English learners from various language backgrounds and compared their spelling performance with both adult and children native English speakers. Although many of the errors which Cook found were similar across the three groups of participants, some of them were associated with specific groups only. For example, the

Japanese participants confused the phonemes /l/ and /r/ and produced errors like *walmer* (warmer), *familiality* (familiarity), *grobal* (global), and *sarary* (salary). Cook proposed two possible explanations for these errors. On the one hand, they could be attributed to Japanese not distinguishing /l/ and /r/. On the other hand, the conventional spelling of some Romaji words, a Roman script used for writing Kana, differs from English (e.g. *sarari*). In addition to this finding, Cook noted that the Greek participants confused /b/ and /p/ in words like *cabable* (capable) and *propably* (probably). Cook argued that these errors may be, but not necessarily, due to the absence of /p/ from Greek. Wang and Geva (2003a) also observed similar findings with Cantonese children, who had more difficulty than English children in spelling *th* /θ/ and *sh* /ʃ/, two phonemes which are present in English but absent from Cantonese, but not *ck* (as /k/ is a phoneme present in Cantonese). The most prominent errors were *s* and *z* for *th*, and *s* for *sh*. The authors of this study explained that these errors were due to negative transfer from first language to second language because it was difficult for the Cantonese children to map the phonemes with their written representations because they are absent from their first language. For this reason, they borrowed close phonemes from their first language. The authors further explained that the difficulty in spelling *th* and *sh* was not due to the orthographic representation of the digraphs, but to their phonological representations because the Cantonese children outperformed the native English children in spelling *ck*. They further explained that the children in the two groups did not differ in spelling *p*, as /p/ is a sound available in both language systems.

When the phonological systems of the first and second languages vary, children may also omit the different phonemes from their spelling (e.g. Morris, 2001; Terrebone, 1973, as cited in Figueredo, 2006). Morris (2001) examined the spelling of 215 children in grades 5 and 6 from eight different intensive English Second Language classes. Most of the participants in this study spoke French as their first language and lived in environments where French was used heavily for communication. The children were asked to write a story based on a picture of a mother who was speaking to a policemen. The students had about 25 minutes to write their stories and were instructed to use French words if they did not know the suitable English words. The spelling errors were classified and a count was kept for the type of reoccurring errors. One of the findings of this study was that children dropped /h/ from *house* (as cited in Figueredo, 2006). Similarly, Spanish students dropped /d/ from the consonant cluster in the word *mind* (Terrebone, 1973, as cited in Figueredo, 2006).

Spelling Transfer from Arabic to English

Research in the transfer of spelling from Arabic to English is limited. Nevertheless, a few studies have shown that the Arabic language influences spelling in English both positively and negatively (Abu-Rabia & Siegel, 2002; Ibrahim, 1978; Ryan & Meara, 1991).

Ibrahim (1978) explained the spelling errors in the writings of undergraduate Arabic students of English enrolled in the Department of English at the University of Jordan. Among the errors he noted were ones which resulted from silent letters, as the

case in the word *goverment* (government). Also, some of the errors were caused by the differences between the Arabic and English sound systems. For example, the English language has two distinctive bilabial plosives /p/ and /b/, while Arabic only has the latter. This accounted for errors of substitution of /b/ for /p/ in words like *blaying* (playing), *bicture* (picture), and *Jaban* (Japan), and for spelling errors such as *hapit* (habit), *hoppy* (hobby), *clup* (club), *compination* (combination), and *distripution* (distribution). The difference between the two sound systems also accounted for spelling errors such as *covernment* (government) since neither Literary Arabic nor Jordanian Spoken Arabic have the sound /g/. Furthermore, *coast* was written as *cost* because, as Ibrahim explained, the Arabic sound system only has /o/ while the English sound system has /ou/ and /ɔ/.

In a more recent study, Abu-Rabia and Siegel (2002) investigated the reading, language, and memory skills of 56 bilingual Arabic children whose ages ranged between 9 and 14. The children were living in Canada and English was their main language of instruction while Arabic was the language spoken at home. Further, all of the children were learning to read and write in Arabic in a Heritage Language Program. The children were assessed in both their first and second languages. The results of this study demonstrated a significant relationship between the acquisition of word and pseudoword reading, working memory, and syntactic awareness skills in Arabic and English. Additionally, the Arabic speakers performed more poorly in all linguistic tasks, except for the visual task. Furthermore, the Arabic children and the English monolingual children performed similarly on the reading, language, and memory tasks. Nevertheless,

the Arabic children who had problems in reading in English performed better than the English monolingual children with reading disabilities in pseudoword reading and spelling tasks. The results of this study suggested a positive transfer from the regular nature of the Arabic orthography to the English orthography despite the different natures of the two systems (Abu-Rabia & Siegel, 2002).

In another study, Ryan and Meara (1991) investigated the spelling of Arabic speaking English language learners by using 100 frequent ten-letter English words. Each word appeared on a computer screen for approximately one second, followed by a blank screen for about two seconds. Later, the word reappeared spelled either correctly or in an altered form. The altered forms consisted of spelling errors in which one vowel was removed. The subjects were asked to say whether the presentations of the words were identical or not by pressing the YES and NO keys. The participants included ten Arabic speaking students enrolled in university, ten non-Arabic English learners whose English proficiency matched with the Arabic speakers, and ten adult native speakers of English who were teachers in university. The results of the study showed that the overall performance of the Arabic speakers was very poor. On the other hand, the native speakers performed very well and the non-Arabic speaking participants performed at intermediate levels. Furthermore, the reaction time data showed that the Arabic speakers were significantly slower than the other groups. The results of this study suggested that Arabic speakers have great difficulty in processing English words. Ryan and Meara argued that vowels may be causing particular difficulty for Arabic speakers and

suggested that Arabic speakers possibly use mental representations of English words that rely heavily on consonantal segments and ignore vowels.

CHAPTER III

METHOD

Study Design

The purpose of this study was to examine how the Arabic language affects its native speakers in spelling English novel phonemes (/p/ and /v/) and their phoneme pairs /b/ and /f/. The Arabic sound system does not contain the phonemes /p/ and /v/, but it does contain their phoneme pairs /b/ and /f/. The questions which this study attempted to answer are: 1) Will the lack of the phonemes /p/ and /v/ in Arabic affect spelling them by Arabic students? 2) Will the absence of these two phonemes in Arabic but the presence of their phoneme pairs aid or hinder the students in spelling /b/ and /f/? To answer these questions, Arabic students were asked to spell words containing the phonemes /p/, /b/, /v/, and /f/ in the initial and final positions. Additionally, English students were asked to spell the same words in order to establish comparison.

Measure

The measure was a paper and pencil based dictation task which consisted of 124 words. The words were divided randomly over two tests, which were administered over two sessions. The data was collected for more than one study. Only 32 of the words were relevant to the present study and were used for the analysis of this study. There were eight words for each of the four phonemes /p/, /b/, /v/ and /f/: four contained the target phoneme in the initial position, and four included it in the final position. The difficulty

of the words was controlled by only selecting one syllable words which did not have consonant clusters. All of the words were common to both the Arabic and the English participants and appeared in their textbooks.

Procedure

The spelling task was administered to whole classes. Each class consisted of approximately 20-35 students. The target words were divided randomly over two dictation tasks, and were randomized for each class. The tests were administered over two consecutive days for each group of participants. The tests were administered to the Arabic participants by Bahraini English language teachers who were carefully selected to have near native spoken English, and whose pronunciation of the English phonemes was very similar to native speakers of English. A native American speaker of English administered the tests for the English participants. All of the test administrators were able to pronounce English words conventionally.

On the first day, the participants were asked to answer a few questions about themselves on a questionnaire (age, grade level, native language, language spoken at home, and other spoken languages). Next, the administrator gave them instructions for the dictation task and they were given a chance to practice the test procedure on two none target words. Finally, the test administrator read the first target word from the first dictation task aloud once, repeated it in a sentence context, and then read it aloud once again. The participants then wrote the word in the space provided on the answer sheet. The participants were encouraged to write the word even if they were not sure of the

correct spelling. The same procedure was repeated for the remaining words. Consistency across words was maintained in regards to tone and speed of delivery. The same procedure was repeated on the next day for the second dictation task.

Participants

There were two groups of participants in this study: Arabic children and English children. The Arabic participants consisted of 99 students from Bahrain (47 boys and 52 girls, mean age = 9.6). The original sample consisted of 110 students, but the papers of students who were not Bahraini or who had hearing problems were eliminated before the scoring process. The participants were all fourth grade students who were enrolled in single-sex public school in Bahrain, which served middle class families. These students had been learning English in official settings at school since third grade. English is officially the second language in Bahrain, and it is widely used side by side to Arabic on street signs, official documents, and so forth. The participants were chosen to be from fourth grade specifically to investigate the effect of Arabic on spelling in English at the beginning stages of learning English. They were chosen over third grade students to allow sufficient time for the mastery of the English alphabetic and writing system in order to be able to write dictated words. All of the participants were native speakers of Arabic, and spoke Bahraini Arabic at home. The tests of children who came from different Arabic countries were eliminated in order to control for the effect of spoken language on spelling.

There were also 40 monolingual English speaking children from second grade (18 boys and 22 girls, mean age = 8.2) from an original sample of 44 students. The responses of the four participants who spoke English as a second language were not used in the analyses. The participants attended a school in the United States which served middle-class families. This group of participants was matched with the Bahraini group based on the class reading level. First, reading samples which were used in fourth grade English textbooks in Bahrain were collected and the readability of these passages was calculated using Fry's Readability Formula. Then, the same procedure was done to calculate the reading level of texts which were used in the English participants' school. Accordingly, the Bahraini fourth grade students were matched with the English second grade students based on the readability level of the English passages they used in class.

Scoring

A record was kept for how each Arabic participant spelled each of the four phonemes on the target words. Therefore, the answers were divided initially to an open number of categories. For example, *pale* was classified under the *p*, *b*, or *d* category if it was spelled as *pale*, *bale*, or *dale* respectively. The classification was open to all spelling errors and each spelling error received its own category. Afterwards, a count was made and the most frequent spellings were either the correct phoneme, or a substitution of it with its phoneme pair. Hence, the classification was narrowed down to three categories: *correct phoneme*, *phoneme pair*, and *other answers*. The correct phoneme category was restricted to the conventional spelling of the phoneme only. The phoneme pair category

represented errors in which the phoneme was represented with its phoneme pair (*b* for /p/, *p* for /b/, *f* for /v/, and *v* for /f/). Errors like spelling *f* in *fin* or *v* in *cave* with *ph*, for example, were going to be included under these two categories since both *f* and *ph* are graphemes which frequently represent /f/, even if *ph* is not the conventional spelling of the phoneme in the word. However, such errors did not occur. The final category included all of the other errors. Errors other than spelling a phoneme with its phoneme pair were not frequent, and hence they were all included under one category. Nevertheless, any error which occurred more than 0.80% of the time will be reported in the results section. Later, the English participants' responses were scored according to these three categories, with a record kept for their frequent errors in the other category.

Since the aim of this study was investigate the Arabic students' spelling of novel phonemes and their phoneme pairs, and not the accuracy of their spelling, each word was analyzed for the specific target phoneme only. For example, *fig*, *foog*, *fok* and *fg* were all answers which were considered correct for the phoneme /f/ in *fog*. Additionally, the silent *e* which appeared in some of the target words was not accounted for. This procedure was chosen in order to get specific details about how the participants spelled the target phonemes instead of focusing on if the words were spelled correctly or not.

CHAPTER IV

RESULTS

In order to compare the performance of the Arabic speaking participants with the performance of the English speaking participants on the target phonemes, sixteen statistical tests were performed. First, the performance of the Arabic participants was compared with the performance of the English participants on each of the four phonemes. Second, the Arabic participants' performance on /p/ was compared with /b/, and their performance on /v/ was compared with /f/. The same comparisons were used for the English participants. Finally, analyses were carried out on each target phoneme for both the Arabic and the English participants to see whether the performance of the participants differed according to the position of the phoneme in the word.

The SPSS program was used to run the statistical tests. The responses for each group of words representing a target phoneme were analyzed collectively. For example, if all the 99 Arabic participants had answered all of the eight /p/ items, there would have been 792 responses for the phoneme /p/ (inclusive of both the initial and final positions), and 297 responses for the /p/ phoneme in the initial position.

The results were divided into two sections: the Arabic and English participants' performance on /p/ and /b/, and the Arabic and the English participants' performance on /v/ and /f/. In each section, there will be a comparison between the Arabic and the English participants on their performance on each of the four target phonemes separately, a comparison of each group of participants against themselves in their

performance on the phoneme position (initial versus final), and a comparison of each group of participants against themselves in their performance on the novel phoneme versus its phoneme pair.

Performance on the Phonemes /p/ and b/

Performance on the phoneme /p/ for the Arabic versus the English participants

The total number of responses for the target words which contained /p/ was 704 for the Arabic participants (88.89%). Of these, /p/ was spelled correctly 36.93% of the time, spelled as *b* 36.65% of the time, and spelled with other alternatives 26.42% of the time. The most reoccurring errors in the other category were the graphemes *d*, *v*, and *h* (3.55%, 1.28%, and 1.14% consecutively). The total number of responses for the English participants was 301(94.06%). The target phoneme was spelled correctly 89.04% of the time, was replaced with its phoneme pair 0.33% of the time, and was spelled with a grapheme representing another sound 10.63% of the time. The most repeated errors in the other category were *h* and *t* (5.32% and 1.67% successively).

The chi-square test was applied on the results to compare the performance of the Arabic participants with the English participants (see Table 2 and Figure 1). For this data the chi-square value is $\chi^2 = 241.09$ (df=2), which is a statistically significant at p<0.05. The standard and adjusted residuals reveal that the Arabic participants tended to make more errors in spelling /p/ and that they were apt to spell it as *b* in comparison to the English participants. In contrast, the English participants generally spelled /p/ correctly, and they were unlikely to replace it with its phoneme pair. The relative risk values show

Table 2 Comparison between the Arabic and the English participants' performance on the phonemes /p/ and /b/.

Phoneme				Correct	Phoneme Pair	Other
/p/[1]	Group	Arabic	Count	260	258	186
			Expected count	369.86	181.43	152.71
			Percentage	36.93%	36.65%	26.42%
			Std. Residual	-5.7	5.7	2.7
			Adjusted Residual	-15.2	12.1	5.6
		English	Count	268	1	32
			Expected count	158.14	77.57	65.29
			Percentage	89.04%	0.33%	10.63%
			Std. Residual	8.7	-8.7	-4.1
			Adjusted Residual	15.2	-12.1	-5.6
/b/[2]	Group	Arabic	Count	395	133	184
			Expected count	450.93	94.93	166.13
			Percentage	55.48%	18.68%	25.84%
			Std. Residual	-2.6	3.9	1.4
			Adjusted Residual	-7.9	7.6	2.9
		English	Count	251	3	54
			Expected count	195.07	41.07	71.87
			Percentage	81.49%	0.97%	17.53%
			Std. Residual	4.0	-5.9	-2.1
			Adjusted Residual	7.9	-7.6	-2.9

[1] χ^2=241.091, *df*=2, *p*=0.000, *V*=0.490
[2] χ^2=79.889, *df*=2, *p*=0.000, *V*=0.280

that the English participants were 2.41 times more likely to spell /p/ correctly than the Arabic participants, and that the Arabic participants were 122 times more likely than the English participants to substitute this phoneme with its pair, and 2.49 times more likely to have other answers. The effect size *V* is 0.49, which is large (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

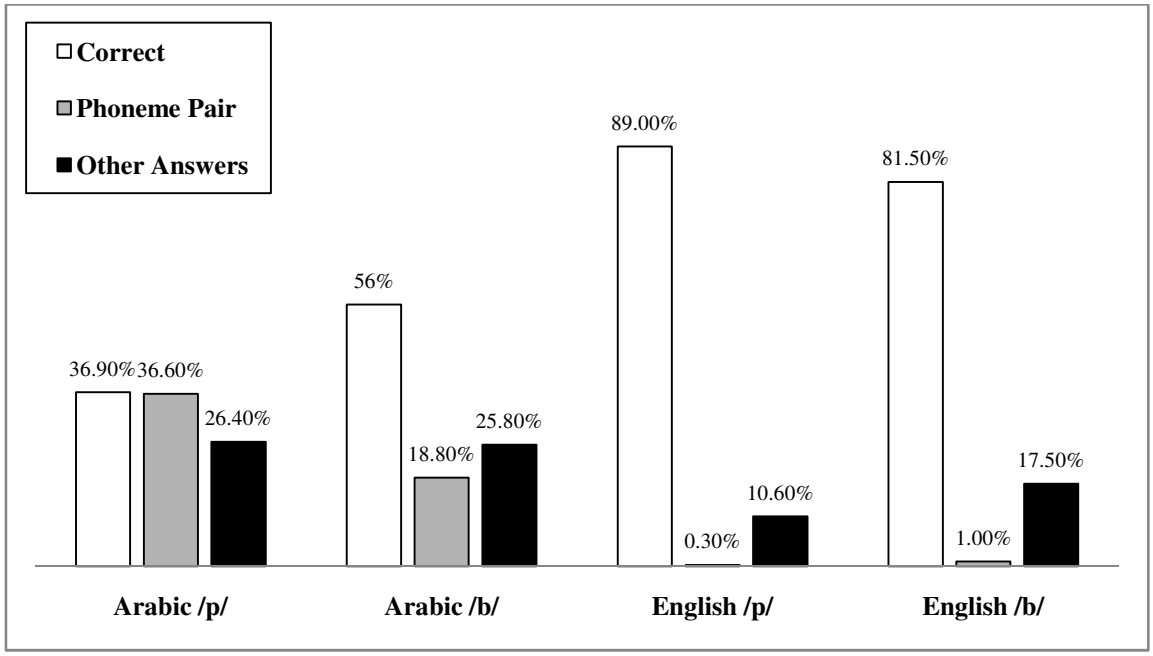

Fig.1 Percentages of *correct*, *phoneme pair*, and *other answers* for the phonemes /p/ and /b/ for the Arabic and the English participants.

Position of the phoneme /p/

Arabic participants. The total number of responses for the initial position was 348 (87.88%), of which, 39.08% were correct, 38.79% were phoneme pair, and 22.13% were other answers. The most occurring errors in the other category were the graphemes *h* (2.30%) and *d* (2.01%). The responses for the final position were 356, of which, 34.83% were correct, 34.55% were phoneme pair, and 30.62% were other answers. The most frequent errors in the other category were the graphemes *d* (5.06%) and *v* (2.25%). A chi-square test of the relationship between spelling /p/ in the initial position versus the final position produced $\chi^2 = 5.53$ ($df = 2$), which is statistically significant at $p<0.05$ (see Table 3). A closer look at the standard and adjusted residuals reveals that the difference between spelling /p/ in the initial position versus spelling it in the final position was due

Table 3 Comparison between spelling /p/ in the initial versus the final positions.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Position	Initial	Count	136	135	77
			Expected count	128.52	127.53	91.94
			Percentage	39.08%	38.79%	22.13%
			Std. Residual	0.7	0.7	-1.6
			Adjusted Residual	1.2	1.2	-2.6
		Final	Count	124	123	109
			Expected count	131.48	130.47	94.06
			Percentage	34.83%	34.55%	30.62%
			Std. Residual	-0.7	-0.7	1.5
			Adjusted Residual	-1.2	-1.2	2.6
English[2]	Position	Initial	Count	128	1	21
			Expected count	133.55	0.50	15.95
			Percentage	85.33%	0.67%	14.00%
			Std. Residual	-0.5	0.7	1.3
			Adjusted Residual	-2.0	1.0	1.9
		Final	Count	140	0	11
			Expected count	134.45	0.50	16.05
			Percentage	92.72%	0%	7.28%
			Std. Residual	0.5	-0.7	-1.3
			Adjusted Residual	2.0	-1.0	-1.9

[1] χ^2=6.527, *df*=2, *p*=0.038, *V*=0.096
[2] χ^2=4.659, *df*=2, *p*=0.097

to the errors in the other category. The Arabic participants tended to make more errors in the other category for /p/ in the final position than in the initial position. However, the effect size *V*=0.096 is small (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

English participants. The total number of responses for the initial position was 150 (93.75%), of which 85.33% were correct, 0.67% were phoneme pair, and 14% were other answers. The most repeated error in the other category was the grapheme *h*

(10.67%). The total number of responses for the final position was 151 (94.38%), of which, 92.72% were correct, and 7.28% were other answers (there were no phoneme pair answers). The most frequent error in the other category was the grapheme *t* (3.31%). The observed chi-square value of these findings is 4.66 (*df*=2), which is not statistically significant at $p>0.05$ (see Table 3). This means that the performance of the English participants in spelling /p/ in the initial position did not significantly differ from their performance on the same phoneme in the final position.

Performance on the phoneme /b/ for the Arabic versus the English participants

There were 712 responses from the Arabic participants for /b/ (89.90%). Of these, 55.48% were correct, 18.68% were phoneme pair, and 25.84 % were other answers. The most occurring error in the other category was the grapheme *d* (4.78%). As for the English participants, there were 308 responses (96.26%); 81.49% were correct, 0.97% were phoneme pair, and 17.53% were other answers. The most repeated errors in the other category were the graphemes *d* (11.04%), *v* (1.95%), and *f* (1.95%). For these data, $\chi^2 = 79.89$ (*df*=2), which is statistically significant at $p<0.05$ (see Table 2 and Figure 1). Examining the standard and adjusted residuals shows that the differences between the Arabic group and the English group were mainly due to the English participants spelling the phoneme /b/ correctly, and the Arabic participants replacing it with its phoneme pair unlike the English participants. The relative risk values show that the English participants were 1.47 times more likely to spell /b/ correctly; and that the Arabic participants were 18.7 more times likely to spell /b/ as *p*, and were 1.47 times

more likely to spell /b/ with other answers. The effect size *V* is 0.28, which is medium (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Position of the phoneme /b/

Arabic participants. The total number of responses for the initial position was 359 (90.66%). Of these, 63.23% were correct, 14.76% were phoneme pair, and 22.01% were other answers. The most frequent error in the other category was the grapheme *d* (3.06%). The total number of responses for the final position was 353 (89.14%). Of these, 47.59% were correct, 22.66% were phoneme pair, and 29.75% were other answers. The most occurring error in the other category was the grapheme *d* (6.52%). The chi-square value is χ^2=17.92 (*df*=2), which is statistically significant at $p<0.05$ (see Table 4). Examining the standard and adjusted residuals reveals that the differences between spelling /b/ in the initial position versus the final position were a result of /b/ spelled more correctly in the initial position than the final position, /b/ spelled as *p* in the final position more than the initial position, and more errors in the other category in the final position. The risk values show that the Arabic participants were 1.33 times more likely to spell /b/ correctly in the initial position, were 1.53 times more likely to spell /b/ as *p* in the final position, and were 1.35 times more likely to spell /b/ with other answers in the final position. The *V* value of these differences is 0.16, which is a small effect size (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

English participants. The number of responses for the initial position was 155 (96.88%). Of these, 88.39% were correct, 0.65% were phoneme pair, and 10.97% were other answers. The most repeated answers in the other category were the graphemes *d*

Table 4 Comparison between spelling /b/ in the initial versus the final positions.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Position	Initial	Count	227	53	79
			Expected count	199.16	67.06	92.78
			Percentage	63.23%	14.76%	22.01%
			Std. Residual	2.0	-1.7	-1.4
			Adjusted Residual	4.2	-2.7	-2.4
		Final	Count	168	80	105
			Expected count	195.84	65.94	91.22
			Percentage	47.59%	22.66%	29.75%
			Std. Residual	-2.0	1.7	1.4
			Adjusted Residual	-4.2	2.7	2.4
English[2]	Position	Initial	Count	137	1	17
			Expected count	126.31	1.51	27.18
			Percentage	88.39%	0.65%	10.97%
			Std. Residual	1.0	-0.4	-2.0
			Adjusted Residual	3.1	-0.6	-3.0
		Final	Count	114	2	37
			Expected count	124.69	1.49	26.82
			Percentage	74.51%	1.31%	24.18%
			Std. Residual	-1.0	0.4	2.0
			Adjusted Residual	-3.1	0.6	3.0

[1] χ^2=17.918, *df*=2, *p*=0.000, *V*=0.159
[2] χ^2=9.836, *df*=2, *p*=0.007, *V*=0.179

(4.52%), *f* (3.87%), and *v* (1.29%). The responses for the final position were 153 (95.63%). Of these, 74.51% were correct, 1.31% were phoneme pair, and 24.18% were other answers. The most frequent answers under the other category were the graphemes *d* (17.65%) and *v* (2.61%). For these data, the χ^2 = 9.84 (*df*=2), which is statistically significant at p<0.05 (see Table 4). The standard and adjusted residual values show that the differences between spelling /b/ in the initial position for the English participants

were mostly due to more errors in the other category for the final position, and for the phoneme being spelled more correctly in the initial position. The *V* value is 0.18, which is a small effect size (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Comparison between performance on the phoneme /p/ and the phoneme /b/

Arabic participants. The total number of responses for /p/ was 704 (88.89%), of which, 36.93% were spelled correctly, 36.65% were spelled with the phoneme pair, and 26.42% were other answers. The total number of responses for /b/ was 712, of which 55.48% were correct, 18.68% were phoneme pair, and 25.84 % were other answers. A chi-square test of the relationship between spelling /p/ and its phoneme pair /b/ produced χ^2=67.75 (*df*=2), which is statistically significant at $p<0.05$ (see Table 5 and Figure 1). The values of the standard and adjusted residuals show that the difference between spelling /p/ and /b/ was not due to the errors in the other category. Instead, it was mainly due to replacing /p/ with its phoneme pair more than replacing /b/ with its phoneme pair, and to spelling /b/ more accurately than /p/. The relative risk values indicate that the Arabic participants were 1.50 times more likely to spell /b/ correctly than to spell /p/ correctly; and were 1.96 times more likely to replace /p/ with its phoneme pair than to replace /b/ with its phoneme pair. The *V* value is 0.22, which is considered a medium effect size (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

English participants. The total number of responses for /p/ was 301(94.06%), of which, 89.04% were correct, 0.33% were phoneme pair, and 10.63% were other answers. The total number of responses for /b/ was 308 (96.26%); of which, 81.49% were correct, 0.97% were phoneme pair, and 17.53% were other answers. For this data,

Table 5 Comparison between performance on the phoneme /p/ and the phoneme /b/.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Phoneme	/p/	Count	260	258	186
			Expected count	325.65	194.40	183.95
			Percentage	36.93%	36.65%	26.42%
			Std. Residual	-3.6	4.6	0.2
			Adjusted Residual	-7.0	7.6	0.2
		/b/	Count	395	133	184
			Expected count	329.35	196.60	186.05
			Percentage	55.48%	18.68%	25.84%
			Std. Residual	3.6	-4.5	-0.1
			Adjusted Residual	7.0	-7.6	-0.2
English[2]	Phoneme	/p/	Count	268	1	32
			Expected count	256.52	1.98	42.51
			Percentage	89.04%	0.33%	10.63%
			Std. Residual	0.7	-0.7	-1.6
			Adjusted Residual	2.6	-1.0	-2.4
		/b/	Count	251	3	54
			Expected count	262.48	2.02	43.49
			Percentage	81.49%	0.97%	17.53%
			Std. Residual	-0.7	0.7	1.6
			Adjusted Residual	-2.6	1.0	2.4

[1] χ^2=67.754, *df*=2, *p*=0.000, *V*=0.219
[2] χ^2=7.105, *df*=2, *p*=0.029, *V*=0.108

χ^2=7.11 (*df*=2), which is statistically significant at $p<0.05$ (see Table 5 and Figure 1). The standard and adjusted residual values specify that the difference in performance between /p/ and /b/ was due to the English participants spelling /p/ correctly more than /b/, and for making more errors in the other category for /b/ than for /p/. The relative risk values show that the English participants were 1.09 times more likely to spell /p/ correctly than /b/, and 1.65 times more likely to make errors in the other category for /b/

than /p/. The effect size *V* is 0.11, which is small (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Performance on the Phonemes /v/ and f/

Performance on the phoneme /v/ for the Arabic versus the English participants

The total number of responses for the Arabic participants was 708 (89.39%). Of which, 49.29% were correct, 20.48% were phoneme pair, and 30.23% were other answers. The most prominent errors in the other category were a result of the omission of the /v/ phoneme (1.84%), or substituting it with *b* (1.84%) or *g* (1.84%). The total number of responses for the English participants was 312 (97.5%). Of these, 90.71% were correct, 3.85% were phoneme pair, and 5.45% were other errors. There were no frequent errors in the other category.

The chi-square value for this data is χ^2=157.58 (*df*=2), which is statistically significant at $p<0.05$ (see Table 6 and Figure 2). Examining the standard and adjusted residual values reveals that difference in performance was due to all of the three answer categories. The English participants outperformed the Arabic participants in spelling /v/ correctly, the Arabic participants used the phoneme pair to spell /v/ more than the English participants did, and the Arabic participants made more errors in the other category than the English participants did. The relative risk values indicate that the English participants were 1.84 more times likely to spell /v/ correctly than the Arabic participants; and that the Arabic participants were 5.40 times more likely to spell /v/ as *f*, and were 5.60 more times likely to make other errors in spelling /v/ than the English

Table 6 Comparison between the Arabic and the English participants' performance on the phonemes /v/ and /f/.

Phoneme	Group			Correct	Phoneme Pair	Other
/v/[1]	Group	Arabic	Count	349	145	214
			Expected count	438.68	109.98	160.34
			Percentage	49.29%	20.48%	30.23%
			Std. Residual	-4.3	3.5	4.2
			Adjusted Residual	-12.6	6.8	8.7
		English	Count	283	12	17
			Expected count	193.32	48.02	70.66
			Percentage	90.71%	3.85%	5.45%
			Std. Residual	6.5	-5.2	-6.4
			Adjusted Residual	12.6	-6.8	-8.7
/f/[2]	Group	Arabic	Count	524	32	162
			Expected count	563.94	25.10	128.96
			Percentage	72.98%	4.46%	22.56%
			Std. Residual	-1.7	1.4	2.9
			Adjusted Residual	-6.6	2.5	5.8
		English	Count	285	4	23
			Expected count	245.06	10.90	56.04
			Percentage	91.35%	1.28%	7.37%
			Std. Residual	2.6	-2.1	-4.4
			Adjusted Residual	6.6	-2.5	-5.8

[1] χ^2=157.575, *df*=2, *p*=0.000, *V*=0.393
[2] χ^2=43.555, *df*=2, *p*=0.000, *V*=0.206

participants. The effect size *V* is 0.40, which is large (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Position of the phoneme /v/

Arabic participants. The total number of responses for the initial position was 349 (88.13%). Of these, 52.15% were correct, 19.48% were phoneme pair, and 28.37% were other errors. The most occurring errors in the other category were the graphemes *b*

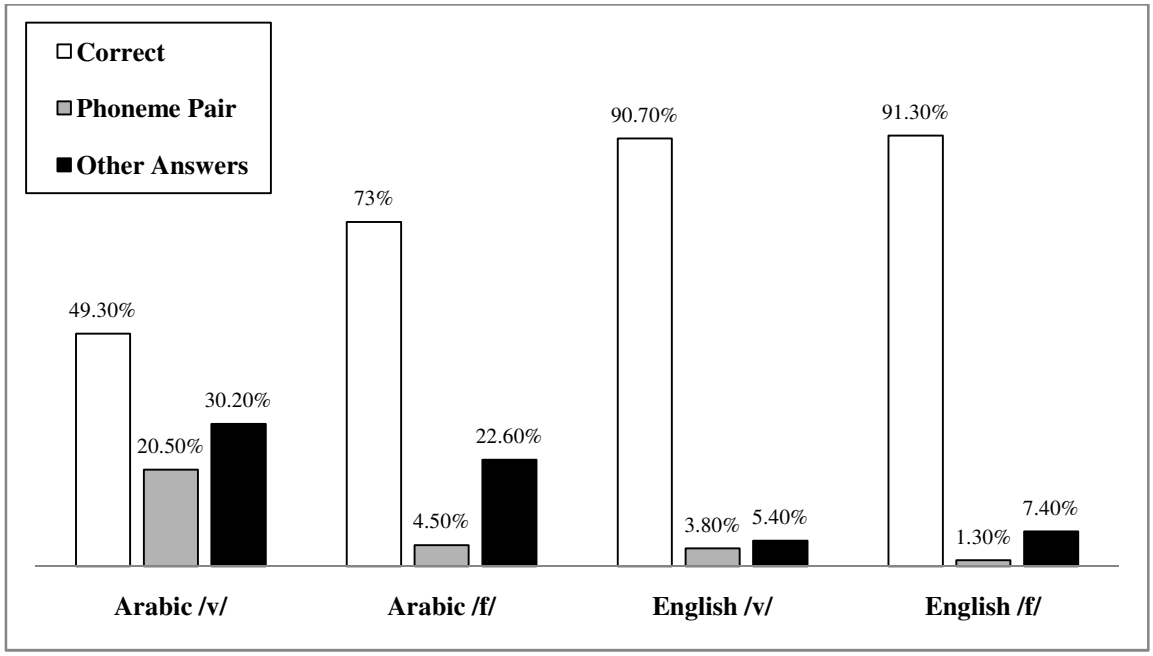

Fig.2 Percentages of *correct*, *phoneme pair*, and *other answers* for the phonemes /v/ and /f/ for the Arabic and the English participants.

(3.44%), *g* (1.72%), and *p* (1.43%). The overall number of responses for the final position was 359 (90.66%), of which, 46.52% were correct, 21.45% were phoneme pair, and 32.03% were errors in the other category. The most frequent error in the other category was a result of omitting /v/ (3.34%). The second most occurring error was spelling /v/ as *g* (1.95%). For this data, χ^2=2.259 (*df*=2), which is not statistically significant at $p>0.05$ (see Table 7).

English participants. For the initial position, there was a total of 155 responses (96.88%). The percentages of the answers were: 91.61% correct, 5.16% phoneme pair, and 3.23% other answers. For the final position, the total number of responses was 157 (98.13%). The responses were 89.81% correct, 2.55% phoneme pair, and 7.64% other answers. Analysis of frequencies produced χ^2=4.21 (*df*=2), which is not statistically

Table 7 Comparison between spelling /v/ in the initial versus the final positions.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Position	Initial	Count	182	68	99
			Expected count	172.04	71.48	105.49
			Percentage	52.15%	19.48%	28.37%
			Std. Residual	0.8	-0.4	-0.6
			Adjusted Residual	1.5	-0.6	-1.1
		Final	Count	167	77	115
			Expected count	176.96	73.52	108.51
			Percentage	46.52%	21.45%	32.03%
			Std. Residual	-0.7	0.4	0.6
			Adjusted Residual	-1.5	0.6	1.1
English[2]	Position	Initial	Count	142	8	5
			Expected count	140.59	5.96	8.45
			Percentage	91.61%	5.16%	3.23%
			Std. Residual	0.1	0.8	-1.2
			Adjusted Residual	0.5	1.2	-1.7
		Final	Count	141	4	12
			Expected count	142.41	6.04	8.55
			Percentage	89.81%	2.55%	7.64%
			Std. Residual	-0.1	-0.8	1.2
			Adjusted Residual	-0.5	-1.2	1.7

[1] χ^2=2.259, *df*=2, *p*=0.323
[2] χ^2=4.207, *df*=2, *p*=0.122

significant at *p*>0.05 (see Table 7).

Performance on the phoneme /f/ for the Arabic versus the English participants

There were 718 (90.66%) responses for the Arabic participants, which consisted of 72.98% correct answers, 4.46% phoneme pair, and 22.56% other answers. The most frequent error in the other category was the grapheme *th* (0.84%). As for the English participants, there were 312 (97.5%) responses, which consisted of 91.35% correct

answers, 1.28% phoneme pair, and 7.37% other answers. Like the Arabic participants, the most occurring error in the other category was *th* (1.60%). For this data, χ^2=43.56 (*df*=2), which is statistically significant at $p<0.05$ (see Table 6 and Figure 2). The values of the standard and adjusted residuals reveal that the difference between the Arabic group and the English group was mainly due to the English participants spelling this phoneme correctly, and the Arabic participants making more errors in the other category and spelling /f/ with its phoneme pair. The relative risk values indicate that the English participants were 1.25 times more likely to spell /f/ correctly than the Arabic participants; and that the Arabic participants were 3.46 times more likely to spell /f/ as *v* and 3.05 times more likely to make errors in the other category than the English participants. However, the effect size *V*=0.21 of these findings is a small (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Position of the phoneme /f/

Arabic participants. There were 356 responses for the initial position (89.90%), which consisted of 78.65 % correct answers, 0.56 % phoneme pair, and 20.79% other answers. The most repeated error in the other category was the grapheme *th* (1.40%). As for the final position, there were 362 responses (91.41%), which were 67.40 % correct, 8.29% phoneme pair, and 24.31% other answers. Like the initial position, the most frequent error in the other category was the grapheme *th* (0.83%). The statistic value for this data is χ^2=28.14 (*df*=2), which is statistically significant at $p<0.05$ (see Table 8). The standard and adjusted residual values specify that the difference between the Arabic participants' spelling of /f/ in the initial position versus spelling it in the final position

Table 8 Comparison between spelling /f/ in the initial versus the final positions.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Position	Initial	Count	280	2	74
			Expected count	259.81	15.87	80.32
			Percentage	78.65%	0.56%	20.79%
			Std. Residual	1.3	-3.5	-0.7
			Adjusted Residual	3.4	-5.0	-1.1
		Final	Count	244	30	88
			Expected count	264.19	16.13	81.68
			Percentage	67.40%	8.29%	24.31%
			Std. Residual	-1.2	3.5	0.7
			Adjusted Residual	-3.4	5.0	1.1
English[2]	Position	Initial	Count	149	0	6
			Expected count	141.59	1.99	11.43
			Percentage	96.13%	0%	3.87%
			Std. Residual	0.6	-1.4	-1.6
			Adjusted Residual	3.0	-2.0	-2.4
		Final	Count	136	4	17
			Expected count	143.41	2.01	11.57
			Percentage	86.62%	2.55%	10.83%
			Std. Residual	-0.6	1.4	1.6
			Adjusted Residual	-3.0	2.0	2.4

[1] χ^2=28.135, *df*=2, *p*=0.000, *V*=0.198
[2] χ^2=9.841, *df*=2, *p*=0.007, *V*=0.178

was mostly due to the substitution of /f/ with its phoneme pair in the final position than the initial position, and to spelling /f/ correctly more often in the initial position than the final position. The relative risk values indicate that the Arabic participants were 13.83 times more likely to spell /f/ as *v* in the final position, and they were 1.17 times more likely to spell /f/ correctly in the initial position. Nevertheless, the effect size *V*=0.20, which is small (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

English participants. There were 155 (96.88%) responses for the initial position. The percentages of the answers were: 96.13% correct, and 3.87% other answers (no one used the phoneme pair to spell /f/ in the initial position). The most occurring error in the other category was *th* (1.29%). As for the final position, there was a total of 157 responses (98.13%), of which, 86.62% were correct, 2.55% were phoneme pair, and 10.83% were other answers. Like the initial position, the most repeated error in the final position was *th* (1.94%). The chi-square value for these frequencies is χ^2=9.84 (*df*=2), which is statistically significant at $p<0.05$ (see Table 8). The standard and adjusted residuals indicate that the difference between spelling /f/ in the initial position versus the final position was mostly due to spelling /f/ correctly more in the initial position, and to using its phoneme pair in the final position more than the initial position. The relative risk values show that the English participants were 1.11 times more likely to spell /f/ correctly in the initial position than the final position, and 2.77 times more likely to spell it with an alternative phoneme other than its phoneme pair in the in the final position than the initial position. However, the effect size *V*=0.18 is small (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

Comparison between performance on the phoneme /v/ and the phoneme /f/

Arabic participants. The total number of responses for /v/ was 708 (89.39%): 49.29% correct, 20.48% phoneme pair, and 30.23% other answers. On the other hand, the number of responses for /f/ was 718 (90.66%): 72.98% correct, 4.46% phoneme pair, and 22.56% other answers. The chi-square value for this data is χ^2=114.35 (*df*=2), which is statistically significant at $p<0.05$ (see Table 9 and Figure 2). The standard and

Table 9 Comparison between performance on the phoneme /v/ and the phoneme /f/.

Group				Correct	Phoneme Pair	Other
Arabic[1]	Phoneme	/v/	Count	349	145	214
			Expected count	433.44	87.88	186.68
			Percentage	49.29%	20.48%	30.23%
			Std. Residual	-4.1	6.1	2.0
			Adjusted Residual	-9.2	9.2	3.3
		/f/	Count	524	32	162
			Expected count	439.56	89.12	189.32
			Percentage	72.98%	4.46%	22.56%
			Std. Residual	4.0	-6.1	-2.0
			Adjusted Residual	9.2	-9.2	-3.3
English[2]	Phoneme	/v/	Count	283	12	17
			Expected count	284.00	8.00	20.00
			Percentage	90.71%	3.85%	5.45%
			Std. Residual	-0.1	1.4	-0.7
			Adjusted Residual	-0.3	2.0	-1.0
		/f/	Count	285	4	23
			Expected count	284.00	8.00	20.00
			Percentage	91.35%	1.28%	7.37%
			Std. Residual	0.1	-1.4	0.7
			Adjusted Residual	0.3	-2.0	1.0

[1] χ^2=114.348, *df*=2, *p*=0.000, *V*=0.283
[2] χ^2=4.907, *df*=2, *p*=0.086, *V*=0.089

adjusted residual values reveal that the main difference between spelling /v/ and /f/ was due to all of the three answer categories. The Arabic participants spelled /v/ more poorly than /f/, substituted /v/ with its phoneme pair more than substituting /f/ with its phoneme pair, and made more errors in spelling /v/ than /f/ in the other category. The relative risk values indicate that the Arabic participants were 1.48 times more likely to spell /f/ correctly than /v/, were 4.56 more likely to substitute /v/ with its phoneme pair than

doing so for /f/, and 1.34 times more likely to make errors in the other category for /v/ than /f/. The effect size *V* is 0.29, which is medium (Cohen, 1988, as cited in Gravetter & Wallnau, 2005).

English participants. There were 312 (97.5%) responses for /v/: 90.71% correct, 3.85% phoneme pair, and 5.45% other answers. As for /f/, there were 312 (97.5%) responses: 91.35% correct, 1.28% phoneme pair, and 7.37% other answers. For this data, the chi-square values χ^2=4.91 (*df*=2), which is not statistically significant at $p>0.05$ (see Table 9 and Figure 2). Therefore, the performance of the English participants did not differ across the phonemes /v/ and /f/.

CHAPTER V

SUMMARY AND DISCUSSION

The purpose of the present study was to examine the effect of Arabic as a first language on spelling in English. The performance of Arabic participants was compared with English monolingual participants on two novel phonemes which are not a part of the Arabic language (/p/ and /v/), in addition to their phoneme pairs (/b/ and /f/). The chi-square analyses showed that the Arabic participants' spelling of /p/ and /v/ differed significantly from the English counterparts with a large effect size. The negative effect of the Arabic language on spelling in English was evident in Arabic participants' use of a close phoneme from their first language (voiced or unvoiced phoneme pair) to spell the novel phonemes. Specifically, they used *b* to spell /p/, and *f* to spell /v/. The confusion between novel phonemes and their phoneme pairs occurred even when the phonemes were present in Arabic. The Arabic participants tended to not only spell /p/ as *b* and /v/ as *f*, but to spell /b/ as *p* and /f/ as *v* as well. These spelling errors can be attributed to the Arabic participants' phonological knowledge of their first language. Both Spoken and Literary Arabic do not have the sounds /p/ and /v/. The Arabic participants had grown up with phonological knowledge specific to their first language, and although they were exposed to the English language for some time prior to taking part this study, their English phonological knowledge had not developed to the extent that they can differentiate between the two novel phonemes and their phoneme pairs. As a result, the Arabic participants confused /p/ and /b/ and /f/ and /v/.

The findings of this study are consistent with Ibrahim's (1978) findings regarding Arabic Jordanian university students. Ibrahim reported that the participants in his study wrote /p/ as *b*, and /b/ as *p*. However, Ibrahim did not report any errors related to the phonemes /v/ and /f/. It is likely that he did not encounter such errors because /v/ is less popular than /p/ in the English language and since his investigation was based on the collection of writing samples of students rather than systematically chosen words. Another possibility is that the confusion of /p/ and /b/ but not /v/ and /f/ may persist until university as the participants in Ibrahim's study, unlike this study, were adults and not children. This explanation is also probable since the Arabic participants in the current study had more errors in spelling /p/ than /v/. Further systematic investigations on these phonemes are needed on older children and adults.

The confusion of similar phonemes was also found in other studies across languages (Cook, 1997; Cronnell, 1985; Fashola et al., 1996; James et al., 1993; Wang & Geva, 2003a). Cook (1997) found that Greek adults, like the Arabic children in this study, sometimes confused /p/ for /b/. The phoneme /p/ is absent in the Greek language. He also noted that the Japanese adults in his study did not always differentiate between /l/ and /r/, as the Japanese language does not distinguish between these two phonemes. Cronnell (1985) reported that Spanish children confused English sounds which did not contrast in the Spanish language: /ð/ and /d/ and /z/ and /s/. Moreover, Fashola et al. (1996) found that Spanish children made errors in spelling English words because of their first language (e.g., spelled /h/ as *j*, confused *b* and *v*). Further, James et al. (1996) noted spelling errors in English due to the influence of first language with Welsh

children (e.g., spelled /ʧ/ as *ti).* Similarly, Wang and Geva (2003a) found that young Cantonese children substituted /θ/ and /ʃ/, two phonemes which are not a part of the Cantonese language, with other phonemes from their first language (mostly *s* for *sh* and *s* and *z* for *th*).

The present findings are similar to the conclusions of Fashola et al. (1996) on Spanish speaking children. Fashola et al.'s study is similar, to an extent, to the present study regarding the analysis of the spelling errors. The authors divided the errors which the participants in their study made into two categories: *errors related to Spanish*, and *other errors*. The errors in this study were divided to *phoneme pair* and *other answers*. The current findings are consistent with Fashola et al.'s findings regarding Spanish speaking children making more errors than the English speaking children in the *predicted errors* category, just like the Arabic participants in this study made more errors than the English participants in confusing the novel phonemes with their phoneme pairs. However, unlike Fashola et al.'s findings, the participants in the present study differed from the English participants in the amount of errors they made in the other category. The number of errors in the other category was higher for the Arabic participants than the English participants, unlike the Spanish participants in Fashola et al.'s study whose number spelling errors in the other category was similar to the English participants. This may be due to the orthographic distance between the languages. The Spanish orthography employs the Roman alphabet. On the other hand, the orthography of the Arabic language is different from the orthography of the English language, and Arabic does not employ the Roman alphabet. Therefore, the orthographic distance

between Arabic and English is wider than the orthographic distance between Spanish and English. Consequently, the positive transfer of graphemes and phonemes which are similar in both English and Spanish may have helped the Spanish children in their spelling. However, further investigation is needed to determine why the Arabic participants produced more errors in the other category than the English participants did.

The findings of this study cannot be extended to older Arabic students without further investigation because all of the participants in the present study were from similar ages. Based on their findings from their study on Chinese children, Wang and Geva (2003a) argued that the phonologically based spelling errors do not persist over time and that such errors mainly exist at the first two years of schooling. On the other hand, Fashola et al. found that the errors which the Spanish participants made in their study and which were related to first language did not decrease significantly over time (from second grade to sixth grade). But what about Arabic students? Ibrahim (1978) found similar errors in regards to confusing /p/ and /b/ for adult Arabic students. However, since he did not compare the Arabic participants in his study with English monolinguals or report the frequency of these errors and the effect size, further research is required to determine if phonologically based spelling errors of Arabic students decrease significantly over time with more exposure to the English language and without formal systematic instruction.

Fashola et al. (1996) proposed a "Componential Analysis of a Word Dictation Task" (p. 827). According to this analysis, English language learners go through three cognitive processes upon being asked to write a word dictated to them orally before

writing the word down. The spelling errors could be a result of any of these three processes. The first process they go through is called the *construction of a sensory representation*, in which the information which was received aurally is held in the sensory memory. In this study, the errors which the Arabic participants did cannot be attributed to this process because it is related to the physical health, and the participants with hearing disorders were not included in the analyses. The second process is the *construction of a phonetic representation*, in which the child matches the sensory information with the known sounds from the long-term memory. This type of error happens if "the sensory representation (i.e., the received sound) does not correspond to a known phoneme in the long-term memory, so the student is most likely to represent the sound as a known phoneme that is similar to the received sound" (Fashola et al., 1996, p. 828). It is apparent from the findings of the present study that this process was a source of error for the Arabic participants. Since the Arabic participants did not have a known phoneme in their long-term memory corresponding to /p/ and /v/, they substituted these two sounds with the closest similar Arabic phonemes, /b/ and /f/, which resulted in spelling /p/ as *b* and /v/ as *f*. The third process is called the *construction of an orthographic representation*, in which the phoneme is matched with a recognized letter string from the long-term memory before the response is written down. This could also possibly be a source of error for the Arabic participants. It is likely that some of the participants who had acquired sufficient knowledge about the English phonology system to differentiate between the novel phonemes and their pairs had problems in converting the phonemes to their written forms. Borrowed words in Arabic which contain the

sounds /p/ or /v/ are written using the graphemes which correspond to the Arabic graphemes representing /b/ and /f/. Hence, it is possible that some participants perceived the phoneme sound correctly and did not have problems in the *construction of a phonetic representation* process, but then matched the phoneme with the Arabic grapheme from the long-term memory, and then translated the Arabic grapheme to the English grapheme. The errors in this case can be attributed to the *construction of an orthographic representation* process.

The errors of representing /b/ as *p* and /v/ as *f* need further explanation. Why did the Arabic participants spell phonemes which are present in their first language, /b/ and /f/, with the graphemes which represent their novel phoneme pairs /p/ and /v/? One possibility for this type of error is what Ibrahim (1978) called *hyper-corrected form of spelling*. According to him, since /p/ is a novel phoneme for Arabic students, English teachers tend to overemphasize teaching its pronunciation in class. As a consequence, some students pronounce both /p/ and /b/ as /p/, and consequently spell /b/ as *p*. Although this may be a valid argument, further research is needed. This is especially true because the raw scores of the present study indicate that only one Arabic participant used *p* to spell /b/ across all of the eight /b/ target words in the dictation task, and that no student used *v* to spell /f/ throughout all of the eight target /f/ words. Another possible reason for this type of error is that the participants did map the phonemes /b/ and /f/ to the corresponding sounds in the long term memory. However, because of their lack of ability to differentiate between the novel phonemes and their phonemes pairs, they perceived the graphemes *p* and *b* and *f* and *v* as two graphemes which correspond to the

same phoneme just like *k* and *c* both correspond to /k/ in *cat* and *kite*. This would explain why they made more errors with the novel phonemes as opposed to the phoneme pairs. The errors for the novel phonemes occurred in the *construction of a phonetic representation* process or the *construction of an orthographic representation* process; but the errors for the phoneme pairs only occurred in the *construction of an orthographic representation* process. Further research should include an auditory discrimination task in order to investigate if Arabic students perform differently from the English students in the novel phonemes, but not the phoneme pairs.

The overall performance of the Arabic and English students indicated that the Arabic students confused /p/ and /b/ more than /v/ and /f/, and that the English participants in contrast confused /v/ and /f/ more than /p/ and /b/. The reason for this difference, which I propose, is that the popularity of the sounds /b/ and /f/ in Arabic is approximately similar. However, there are some, though rare, borrowed words in Spoken Arabic which contain the sound /v/ (e.g., *valve, Vaseline*, *volume*). The sound /v/ in such words is pronounced as /v/ and not /f/. On the other hand, /p/ is pronounced as /b/ in more popular borrowed words (e.g., *paid, Pakistan, park*, *computer*, *power, practice*). This characteristic of Spoken Arabic, in which /v/ is pronounced correctly in borrowed words, while /p/ is pronounced with its phoneme pair, seems to slightly contribute positively to spelling /v/ in English, and negatively to spelling /p/. Arabic students, who pronounce /p/ as /b/ in a word like *power* in their everyday spoken language have to differentiate between spelling the initial sound in this word and other borrowed words which are used in Spoken Arabic like *baby*, and even borrowed words which are used in

both Spoken and Literacy Arabic, like *bus*. This distinction does not need to be made for borrowed words with /v/ like *volume* versus borrowed words with /f/ life *frame* because the pronunciation of the initial sound of these two words does not only differ in English, but in Spoken Arabic as well. On the other hand, the proposed explanation for the English participants' confusion between /v/ and /f/ more than /p/ and /b/ is that /p/ is one of the most prominent sounds in the English language, while /v/ is one of the less popular sounds in this language.

The effect of the position of the phoneme in the word was not apparent. The difference in spelling the target phonemes in the initial versus the final positions was either statistically significant with a small effect size, or was not statistically significant. The Arabic participants did not differ in spelling /v/ in the initial versus the final position, and they only differed slightly in the phonemes /p/, /b/, and /f/ according to the position of the phoneme in the word. The position of the target phonemes did not affect the English students' spelling of /p/ and /v/, and only contributed to a small difference in spelling /b/ and /f/. In all cases in which there was a difference between spelling the phoneme in the initial or the final position, students performed better on the initial position and used the phoneme pair or made errors in the other category more in the final position. The findings of the current study are consistent with the findings of previous studies (Jensen, 1962; Stage & Wagner, 1992; Treiman, Berch, & Weatherston, 1993), which found that kindergarten and first children performed better on spelling consonants in the initial position than in the final position. The difference between spelling consonants in the initial position and the final position did not reach the 0.05 level of

significance for the first graders, but was more evident with the kindergartners (Treiman et al., 1993). Stage and Wagner (1992) examined children in kindergarten through third grade and found that children generally performed better on the initial position than the final position, and better for the final position than the medial position. These differences were lessened as the children got older. Similar findings were reported by Jensen (1962) on children in grades 8 and 10 and junior college freshmen. Treiman et al. (1993) proposed that these differences can be attributed to the children's ability to segment syllable-initials and syllable-finals, and children's short term memory. They explained that the phoneme in the initial position forms the onset of a syllable, which is a unit on its own; while the phonological unit of the consonant at the end of a syllable (rime) is formed with its preceding vowel. They additionally explained that when there are several items which are put in order, it is easier to remember the first ones than the middle and final ones, and that it is easier to remember the final ones than the middles ones.

One of the limitations of this study is that it was based on a group of Arabic children who come from one country only. Different Arabian countries have different spoken varieties, and different spoken varieties may have different effects on the spellings of /p/, /b/, /f/, and /v/. However, besides the limited borrowed words, no Spoken Arabic variety contains the sounds /p/ and /v/ and thus the findings of this study may be applicable to children from other Arabian countries as well. Another limitation of this study is that there were no older participants, and hence one cannot know if the negative influence of Arabic on spelling in English persists overtime or not. Finally, in regards to the position of the phoneme, there were no words which had the target phonemes in the medial

position, which was found to be the most difficult position to spell in previous studies (Jensen, 1962; Stage & Wagner, 1992; Treiman et al., 1993). Such words were not included to control for the syllable patterns and the difficulty of the target words. Further research should replicate with target phonemes in the medial position and with older Arabic students.

Besides the recommendations for further research mentioned above, it would be useful to investigate the effect of Arabic on other English phonemes as well. One could investigate two phoneme pairs which exist across both languages. Findings of such studies will support the findings of the current study if the performance of Arabic children turns out be similar to the performance of the English children. In addition, future research should examine the phonemes which are present in the English language and the Spoken Arabic language but not in Literary Arabic in order to find out whether Spoken Arabic aids spelling in English or not.

The results of the current study provide practical implications for English language literacy classes which are designed for Arabic students. The findings of this study confirm that acquiring a second language is closely related to the learner's first language. It is beneficial for English teachers who teach Arabic students to be able to expect the type of spelling errors which their students will make, and to know the reasons behind these errors and plan systematic instruction accordingly. It would be beneficial for Arabic students to receive instruction in phonological awareness related to novel phonemes and their phonemes pairs, simultaneously with orthographic instruction about how each phoneme is spelled. Additionally, the findings of this study can help in

establishing a spelling scoring rubric which is designed to provide beneficial explanations to students about their spelling errors. Currently, to my knowledge, English teachers in schools in Bahrain grade spelling words as merely correct or incorrect. Hence, a student who spells *pale* as *bale* receives the same grade as the student who spells the same word as *full* or *tn*. However, the spelling in the first example indicates that the students' problem in spelling is related to the phoneme /p/ due to the influence of the Arabic language and hence needs instruction in this area. Alternatively, the spelling error in the last example indicates that the student needs instruction in the alphabetic principle (or even more). Educators need to be able to differentiate between the types of errors which their students make and plan instruction accordingly.

In conclusion, the phonology of the Arabic language affects the spelling of Arabic children in English in both novel phonemes and their phoneme pairs. Arabic learners of English are expected to make more errors in spelling the novel phonemes /p/ and /v/, and make similar, though less, errors in spelling the phonemes pairs /b/ and /f/. Educators need to be aware of these types of errors in order to provide appropriate assessment and feedback for their students, and to plan lessons accordingly.

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APPENDIX A

DICTATION STIMULI WORDS AND SENTENCES

Table 10 Stimuli words for phoneme /p/.

Initial Position	Final Position
Pale	Deep
Pear	Gap
Pill	Hope
Pot	Nap

Sentences

- He has pale skin.
- I ate a pear and an apple.
- My aunt takes one aspirin pill when she has a headache.
- My mom uses a large pot to make rice.
- He fell into a deep hole.
- There is a gap between my front teeth.
- I hope I do well on the exam.
- I took a nap in the afternoon.

Table 11 Stimuli words for phoneme /b/.

Initial Position	Final Position
Bat	Cab
Bite	Lab
Bug	Robe
Bull	Rub

Sentences

- A bat is an animal which flies at night.
- Some insects bite.
- A bug is a small insect.
- A bull is an animal.
- My father took a cab to get to the airport.
- I left my jacket in the science lab.
- I usually wear my robe after taking a shower.
- I rub my eyes when I feel sleepy.

Table 12 Stimuli words for phoneme /v/.

Initial Position	Final Position
Van	Cave
Veil	Hive
Vet	Leave
View	Save

Sentences

- My father drives a van.
- The bride is covering her face with a veil.
- A vet is a doctor for animals.
- I love the view outside.
- I saw two bats in the cave.
- A bee lives in a hive.
- Don’t leave me alone!
- I will save my money from now on.

Table 13 Stimuli words for phoneme /f/.

Initial Position	Final Position
Fin	Leaf
Fog	Beef
Fool	Wife
Fur	Roof

Sentences

- The shark has a big fin.
- It's difficult to see in the fog.
- Don’t act like a fool!
- Cats have soft fur.
- I found a tree leaf by the door.
- We are having beef for dinner tonight.
- My uncle's wife is really nice.
- Every house has a roof.

APPENDIX B

INSTRUCTIONS FOR DICTATION TASK

Instructions:

1. Read the target word in a natural tone and speed. Do *not* read the word too slow, or too fast. Just say it as you would naturally.
2. Read the sentence following, which contains the target word, in a natural tone and speed.
3. Say the target word, again, in a in a natural tone and speed.
4. Allow the students to write down the target word in the appropriate space on the answer sheet.

Teacher's Notes:

Before you begin administering the test, clarify to the students that they have to write the target word *only* on the answer sheet. Also, explain to them that you will say the word, read it in a sentence, and then say the word one more time. Use the practice words below to demonstrate the instructions for your students. Encourage the students to write the word even if they are not sure of its correct spelling. Make sure that your students understand the instructions well before you begin.

Thank you very much for your generous help and support.

***

Practice Words

- Hat
  - I am wearing a hat.
- Name
  - My name is John.

VITA

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